United States Patent [19]

Moore et al.

[11] **3,850,580**

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[54] **LABORATORY MIXER**

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[52] **U.S. Cl.** ..... **23/259,** 233/23 R, 233/24, 259/1 R, 259/DIG. 42

[51] **Int. Cl.** **B01l 9/00,** B01f 11/00

[58] **Field of Search** ..... 23/259; 259/1 R, DIG. 42; 233/23 R, 24

[56] **References Cited**

UNITED STATES PATENTS

3,061,280 10/1962 Kraft et al. 23/259

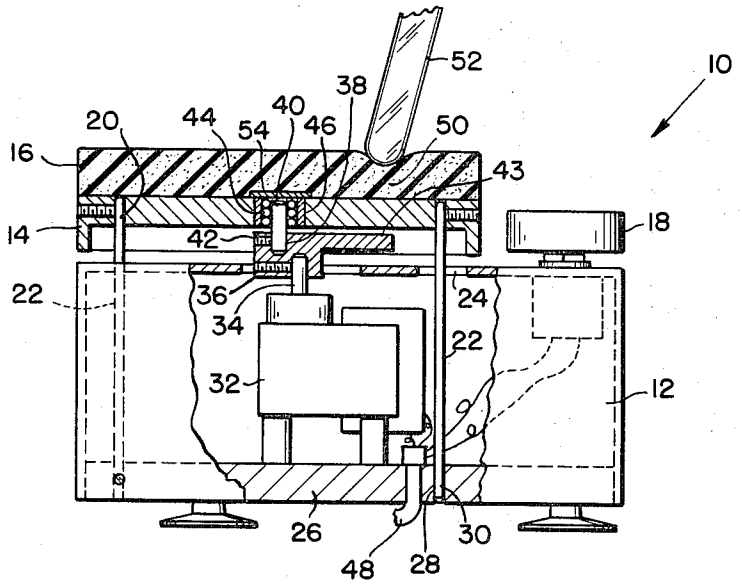
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[57] **ABSTRACT**

A mixer for mixing fluent material contained in test tubes, flasks and like vessels is provided with a resilient surface for receiving the vessel. The surface is then driven eccentrically to agitate the vessel for producing a vortex mixing action in the vessel. Since the surface is resilient, the amount of agitation imparted to the vessel is dependent on the force with which the vessel is pressed against and into the resilient surface.

5 Claims, 2 Drawing Figures



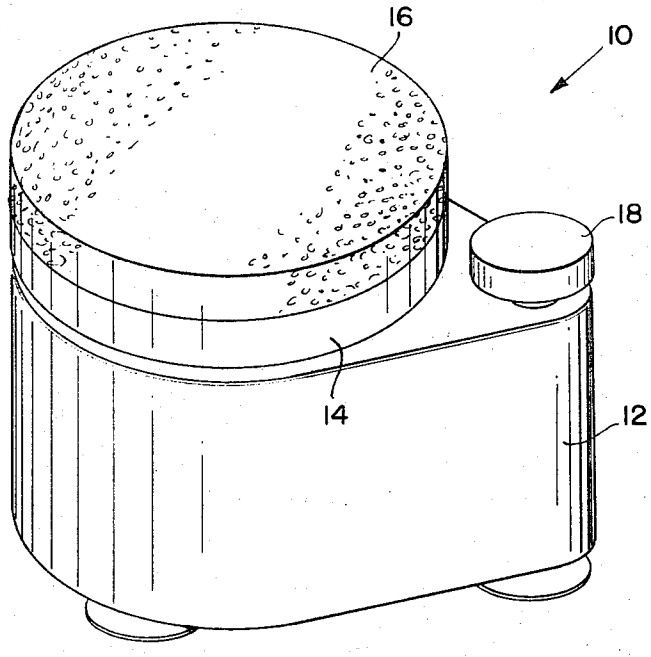

16
10
18
14
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FIG. 1

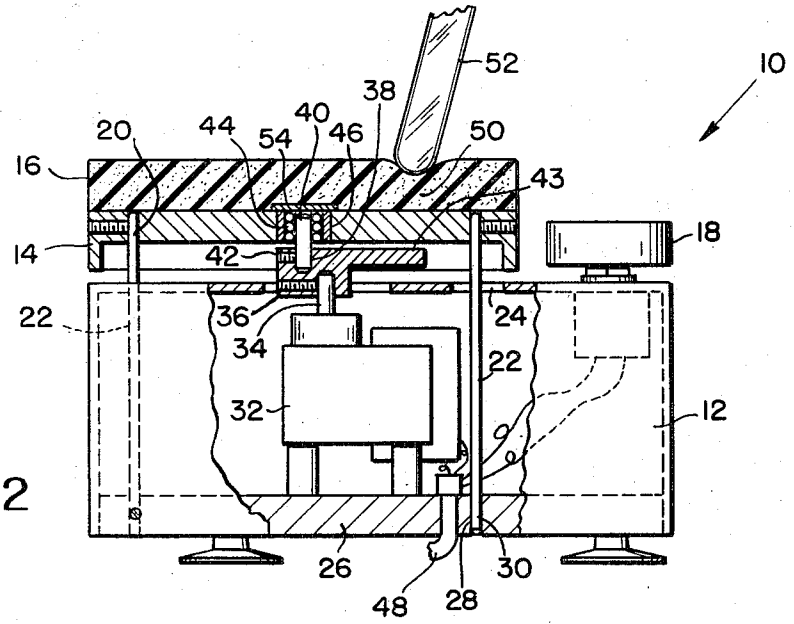

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FIG. 2

LABORATORY MIXER

BACKGROUND OF THE INVENTION

The present invention relates generally to apparatus for mixing fluent material and more specifically to mixers of the type in which a vessel is agitated eccentrically to produce a vortex mixing action. In particular, the mixer of the present invention is intended for use in laboratories and the like to agitate such vessels as test tubes, flasks and similar laboratory vessels.

Such mixers are known in the art, a typical apparatus being illustrated in U.S. Pat. No. 3,061,280. In such mixers, the vessel, usually a test tube, is held in or against a cup-shaped member which is eccentrically driven to agitate the vessel. In some mixers, the amount or degree of agitation can be manually adjusted by changing the throw or rotational speed of the eccentric drive.

With mixers of this type it is not possible to agitate several test tubes at one time or a relatively large vessels such as a flask or a beaker and manual adjustment of the agitation can be difficult when the vessel is being manually held against the eccentrically driven member.

SUMMARY OF THE INVENTION

In the present preferred form of the invention, the mixer is provided with a relatively large resilient top surface supported on three upright wire rod elements which fix the surface against concentric rotation while permitting movement of the surface in a horizontal plane. A dynamic mounting connected beneath the surface drives the resilient top eccentrically, so that any vessel placed on the surface will be agitated. The surface is large enough to accommodate several test tubes or a flask manually held against the surface. No manual means are provided for changing the throw of the eccentric drive. Instead, the degree of agitation transmitted to a vessel depends upon the force with which the vessel is held against the resilient surface.

OBJECTS OF THE INVENTION

One object of the present invention is to provide a mixer for laboratory use which is capable of simultaneously accommodating a plurality of test tubes or like vessels.

Another object is to provide a vortex laboratory mixer having a relatively large eccentrically driven surface against which vessels, such as Erlenmeyer flasks and the like, can be manually held for vortex mixing the fluent contents of the vessel.

A further object is to provide a vortex mixer for laboratory use wherein the eccentrically driven surface against which the vessels are held for mixing is made of a resilient material so that the degree of agitation imparted to the vessel depends upon the force with which the vessel is pressed against and into the resilient surface.

These and other objects, advantages and characterizing features of the present invention will become more apparent upon consideration of the following detailed description thereof when taken in connection with the accompaning drawings depicting the same.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the mixer of the present invention; and

FIG. 2 is a side elevation view of the mixer partly broken away and in section.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, FIG. 1 shows a mixer of the present invention generally indicated at **10.** The mixer includes a base housing **12,** an oscillating plate **14** and a pad member **16** adhesively attached to the plate. The top of the housing also has a push on-push off switch **18** for starting and stopping the oscillation of plate **14.**

FIG. 2 shows that plate **14** is supported on the upper ends **20** of a plurality, typically three, of spring wire rod members **22.** These members extend down into base housing **12** through enlarged openings **24.** Housing **12** has its base plate **26** provided with openings **28** which receive the lower ends **30** of the rods. With this arrangement oscillating plate **14** is resiliently supported above base housing **12** for oscillating movement in a generally horizontal plane.

Disposed within housing **12** and supported on the base plate is an electric drive motor **32.** The motor is eccentrically connected to oscillating plate **14** by a eccentric coupling member **36.** In this respect, motor **32** has its drive shaft **34** fixed to member **36.** Also fixed to member **36** in an opening **38** eccentrically positioned with respect to shaft **34** is a second drive shaft **40.** Any suitable means such as set screws **42** can be used to fix shafts **34** and **40** to member **36.**

Second shaft **40** extends upwardly into a bearing **44** which is fixed in a central opening **46** through oscillating plate **14.** With this arrangement rotation of shaft **34** and eccentric member **36** will rotate shaft **40** in a concentric circle about shaft **34.** This drives oscillating plate **14** but because the plate is fixed by rods **22** against concentric rotation, plate **14** will simply oscillate to shake or agitate any vessel placed on the surface of pad member **16.**

Formed integral with eccentric **36** on the far side of shaft **34** from shaft **40** is a counterbalance portion **43.** This counterbalance provides dynamic stability as the eccentric is being rotated to minimize vibration and "walking" of the apparatus.

In operation, switch **18** is pushed to start motor **32,** the motor receiving electrical power through a line cord, a portion of which is shown at **48.** The operation of motor **32** rotates shaft **34** and the eccentric drive. The rotation of eccentric **36** acting through pin **40** will in turn shake drive plate **14** wherein spring wire rod members **22** prevent plate **14** from rotating but permit the plate to oscillate back and forth and side to side. The motion of plate **14** is transmitted through resilient pad **16** to any test tube flask or like vessel **52** which is placed on and held against the pad. In this way, the fluent material within such a vessel is agitated and mixed.

It is preferred that pad **16** be made of a highly resilient material such as a closed cell foamed neoprene. If such a highly resilient material is used for pad **16,** the amount of agitation transferred to the vessel can be controlled by the force with which the vessel is pressed against and into the resilient pad. In this respect, the greater the force with which the vessels is pressed into resilient pad **16,** the more friction between the vessel and pad and the more compacted and firm will be the area indicated at **50** beneath and around the vessel.

This permits a greater degree of agitation when the vessel is pressed hard against resilient pad **16** and a lesser degree of agitation when the vessel is only lightly pressed against the surface. Thus, in the present invention, the degree of agitation can be changed quickly and easily simply by changing the pressure with which vessel **52** is manually held against and pressed into resilient pad **16.**

In order to protect bearing **44** and prevent resilient pad **16** from being pressed into opening **46** when a vessel is held against the pad, a cover **54** is adhesively attached over the opening.

Having thus described the invention in detail, it should be appreciated that the present invention accomplishes its intended objects in providing a mixer of the vortex mixing type which is suitable laboratory use. The relatively large oscillating surface provided by pad **16** can accommodate a variety of laboratory vessels such as test tubes and flasks. Furthermore, since the vessels are all manually held on pad **16,** it would be possible for the operator to hold a plurality of test tubes in his hand and simultaneously press them all against pad **16.** A further accomplishment of the present invention is that there is no need for means to mechanically adjust the amount of agitation since the degree of agitation can be changed simply by changing the force with which the vessel is pressed against and into resilient pad **16.**

Having thus described the invention, what is claimed as new is:

1. In a laboratory mixer having a base, a plate supported above the base and an eccentric drive means mounted on the base and operatively connected to the plate to shake the plate, the improvement comprising a substantially flat resilient foamed rubber pad fixed to the upper surface of said plate to receive thereon a vessel to be agitated, the degree of agitation imparted to said vessel being determined solely by the force with which said vessel is pressed against said pad.

2. A laboratory mixer as in claim **1** including at least three spring wire rods upstanding from said base, said plate being supported on the upper ends of said rods, said rods preventing rotation of said plate while permiting said plate to vibrate responsive to operation of said eccentric drive means.

3. A laboratory mixer comprising:

a. a base;

b. at least three spring wire rods upstanding from said base;

c. a plate supported on the upstanding ends of said rods;

d. motor means mounted on said base;

e. eccentric means operatively connected to said plate to shake said plate when driven by said motor means; and

f. vessel contact means including a substantially flat pad of resilient material fixed to said plate and adapted to transfer the eccentric motion of said plate to a vessel manually pressed against said pad, the degree of agitation imparted to said vessel by said resilient pad being dependent upon the force with which said vessel is made to frictionally engage and compress said pad.

4. A laboratory mixer as in claim **3** substantially flat wherein said resilient pad is made of closed cell foamed neoprene.

5. A laboratory mixer as in claim **3** including a housing enclosing said motor and a major portion of said spring wire rods, there being openings in the top of said housing to permit passage of the upper ends of said rods so that said plate is supported above the top of said housing.

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